

Semester V
BCA 5011: Database Management System
Major/DS Course (Core)

Credit:04

60 hours

Course Objective

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Learning Outcomes

Upon successful completion of the course, the student will be able to

- Understand the basic concepts of database management systems.
- Apply SQL to find solutions to a broad range of queries.
- Apply normalization techniques to improve database design.
- Analyze a given database application scenario to use ER model for conceptual design of the database.

Syllabus

1.Introduction

Characteristics of database approach, data models, database system architecture and data independence.

2.Entity Relationship (ER) Modelling

Entity types, relationships, constraints.

3.Relation data model

Relational model concepts, relational constraints, relational algebra, SQL queries

4. Database design

Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

5. Transaction Processing

ACID properties, concurrency control & recovery

6. File Structure and Indexing

Operations on files, File of Unordered and ordered records, overview of File organizations, indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishnan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGrawHill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013

BCA 5011: Database Management System (Practical)**Credit:01****30 hours**

Create and use the following database schema to answer the given queries.

EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	Type	NULL	KEY	DEFAULT
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.

8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is A,, 35
14. Query to display Name of all employees either have two R,s or have two A,s in their name and are either in Dept No = 30 or their Manger,s Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with J,, „A,, and M,,.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an A,, in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. Query to display Name and Employee no. Along with their Manger,s Name and the Manager's employee no; along with the Employees,, Name who do not have a Manager.
27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies \$100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a T,,.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

BCA 5012: Theory of Computation

Major/DS Course (Core)

Credit:05

75 hours

Course Objective

The objective of the course is to introduce the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability. Students will learn that certain problems do not admit efficient algorithms and identify such problems

Course Learning Outcomes

Upon successful completion of the course, the student will be able to

- To give an overview of the theoretical foundations of computer science from the perspective of formal languages.
- To illustrate finite state machines to solve problems in computing.
- To explain the hierarchy of problems arising in the computer sciences.
- To familiarize Regular grammars, context free grammar.

Syllabus

Concept of Automation: Definition, concept of sequential circuits, state table & state diagram, concept of synchronous, asynchronous machines.

Finite State Machines: Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, information loss less & inverse machines: testing table & testing graph.

Finite Automata: Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Regular Expressions, Equivalence of DFAs, NFAs, and Regular, Expressions, Non-regular languages, Pumping lemma.

Introduction, definition, derivation trees, simplification, Context-Free Grammar (CFG), Parse Trees.

Pushdown Automata: Definition, moves, Instantaneous Descriptions, Deterministic & Non-Deterministic Push Down Automata (PDA), Acceptance by final state & Empty stack, Equivalence of CFGs and PDAs.

Books:

- 1.Hopcroft JE. and Ullman JD., —Introduction to Automata Theory, Languages & Computation, Narosa.
- 2.Lewis H. R. and Papadimitrou C. H., —Elements of the theory of Computation, P.H.I.
- 3.Kain, —Theory of Automata & Formal Language, McGraw Hill.
- 4.Kohavi ZVI, —Switching & Finite Automata, 2nd Edn., Tata McGraw Hill.

BCA 5013: PHP Programming Major/DS Course (Core)

Credit:04

60 hours

Course Objective

The objective of the course is to understand the fundamental concepts of PHP scripting language, the basic structure of a web application, basics of MySQL database the relationship between the client-side and server-side scripts and creating functional websites and web apps in PHP.

Course Learning Outcomes

Upon successful completion of the course, the student will be able to

- Learn the environment of Server-Side Script.
- Compare and contrast between Client-Side Script & Server-Side Script.
- Learn the use of control structures and numerous native data types with their methods.
- Make Database connectivity between Front End and Back End.
- Develop Dynamic Website that can interact with different kinds of Database Languages.

Syllabus

Introduction to PHP: Open source-PHP – history- features-variables- statements operators- conditional statements-if-switch nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue.

Arrays and Functions: Arrays: Creating an array- modifying array-processing array-grouping form with arrays- using array functions- creating user defined functions- using files- sessions-cookies executing external programs- Creating sample applications using PHP.

Database Management System: Components of Database system-Definition and benefits of database Data Independence-Three level of database architecture-Database Management system Client server architecture-Distributed processing-Domains-Relations-Integrity constraints-Candidate keys-Primary keys-Foreign keys-Functional dependency(Basic definition)-Normal Forms (1NF, 2NF, 3NF, BCNF)-ER model – OOAD model.

MySQL: Effectiveness of MySQL -MySQL Tools-Prerequisites for MySQL connection Databases and tables- MySQL data types-Creating and manipulating tables Insertion, updation and deletion of rows in tables -Retrieving data- Sorting and filtering retrieved data - Advanced data filtering-Data manipulation functions Aggregate functions -Grouping data- Sub queries- Joining Tables- Set operators Full text searching.

PHP with MySQL: Working MySQL with PHP-database connectivity- usage of MYSQL commands in PHP, processing result sets of queries- handling errors-debugging and diagnostic functions validating user input through Database layer and Application layer-formatting query output with Character, Numeric, Date and time –sample database applications.

Books:

1. VIKRAM VASWANI, —PHP and MySQL, Tata McGraw-Hill
2. BEN FORTA , MySQL Crash course — SAMS
3. C.J. DATE, —An Introduction to Database Systems, Addison Wesley, Sixth Edition.
4. Ramesh Elmasri and Shamkant B Navathe, Fundamentals of Database Systems, Pearson Education.

BCA 5013: PHP Programming (Practical)

Credit:01

30 hours

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.

Sample string : 'The quick " " brown fox'

Expected Output : Thequick""brownfox

9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
11. Write a PHP script that checks if a string contains another string.
12. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.

13. Create a script to construct the following pattern, using nested for loop.

```
*  
* *  
* * *  
* * * *  
* * * * *
```

14. Write a simple PHP program to check that emails are valid.

15. WAP to print first n even numbers.

16. \$color = array('white', 'green', 'red')

Write a PHP script which will display the colors in the following way : Output : white, green, red,

- green
- red
- white

17. Using switch case and dropdown list display a —Hello message depending on the language selected in drop down list.

18. Write a PHP program to print Fibonacci series using recursion.

19. Write a PHP script to replace the first 'the' of the following string with 'That'.

Sample : 'the quick brown fox jumps over the lazy dog.'

Expected Result : That quick brown fox jumps over the lazy dog.